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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,969	01/05/2007	Takanori Ichiki	2114-0117PUS1	5623

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EXAMINER

TAI, XIUYU

ART UNIT	PAPER NUMBER
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1759

NOTIFICATION DATE	DELIVERY MODE
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02/03/2011

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No. 10/590,969	Applicant(s) ICHIKI, TAKANORI	
	Examiner Xiuyu Tai	Art Unit 1759	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 8-14 and 16-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Newly submitted claims 16-19 are directed to an invention that is independent from the invention originally claimed for the following reasons: new independent claim 16 includes a micro-antenna having a flat undulating shape with plural turns and claim 18 requires the substrate being made of sapphire, aluminum nitride, silicon nitride, boron nitride, or silicon carbide while the original claim 1 recites a micro-antenna having a flat meandering shape with plural turns and a substrate. Thus, claims 16 and 18 are drawn to different inventions from the invention originally claimed as cited in claim 1.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 16-19 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Response to Arguments

2. Due to the applicant's amendment, the objection to drawings is withdrawn.

3. The applicant's claim for foreign priority is acknowledged and indicated in "Office Action Summary".

4. Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection necessitated by applicant's amendment.

5. In response to the arguments that the references of Ichiki and Yin are not combinable, it should be noted that Ichiki discloses a micro plasma source while Yin et

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al disclose a miniature plasma source for use in micro-electro-mechanical system (page 1516). Both references are related to a plasma source in micro scale; thus, they are analogous art;

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

7. Claims 1-3, 5-7, and 15 are rejected under 35 U.S.C. 102(a) as being anticipated by Ichiki et al ("An atmospheric pressure micro-plasma jet source for the optical emission spectroscopic analysis of liquid sample", Plasma Sources Sci. Technol., 12 (2003), S16-S 20).

8. Regarding claim 1, Ichiki et al discloses a micro plasma jet source (ABSTRACT). The micro plasma source by VHF for generating inductive coupling plasma comprises:

(1) a substrate of alumina or quartz (Figure 1-1, page S 17);

(2) a planar antenna on the substrate 1 (Figure 1-3, page S 17), wherein the antenna is in planar form with a two-turn configuration, extending in alternating directions (Figure 1-3, & 1-4, page S 17) ; and

(3) a discharge tube near to the antenna (Figure 1-4, page S 17]).

9. Regarding claim 2, the reference teaches that the antenna is formed near the edge of the chip (page S17).

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10. Regarding claim 3, the reference teaches that copper is electroplated on the antenna (page S 17).
11. Regarding claim 5, the reference teaches that the substrate may be alumina (Figure 1-1, page S 17).
12. Regarding claim 6, the reference teaches that alumina is used to make one micro-plasma jet source (Figure 4, page S 18).
13. Regarding claim 7, the reference teaches that a VHF transmitter is provided for supplying power (Figure 2, page S 17).
14. Regarding claim 15, the reference teaches that the antenna is formed in a zigzag pattern (i.e. up and down direction, Figure 1, page S 17).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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17. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ichiki et al ("An atmospheric pressure micro-plasma jet source for the optical emission spectroscopic analysis of liquid sample", Plasma Sources Sci. Technol., 12 (2003), S16-S 20) as applied to claim 1 above.

18. Regarding claim 4, Ichiki does not specifically disclose the relationship between the thickness of the plating layer and the depth, but points out that the thickness of antenna affects the plasma production (page S 18, Figure 6) and the effect is limited by the skin depth (page S 18). Therefore, one having ordinary skill in the art would have realized to optimize the thickness of the plating layer and the depth in order to achieve better efficiency of Ichiki.

With respect to the cited equation, It represents optimization of the micro plasma source based on process-limiting parameters, such as the properties of the metal, and the operating frequency. One having ordinary skill in the art would have realized to optimize the ICP design in order to improve efficiency of Ichiki.

19. Claims 1-4, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichiki (JP 2002-257785, cited in IDS) in view of Yin et al ("Miniaturization of Inductively coupled plasma sources", IEEE TRANSACTIONS ON PLASMA SCIENCE. VOL. 27, NO. 5, 1999, page 1516-1524).

20. Regarding claim 1, Ichiki discloses a micro plasma source (ABSTRACT). The micro plasma source by VHF drive for generating inductive coupling plasma (paragraph [0016]) comprises:

(1) a substrate 1 (Drawing 1, paragraph [00116]);

- (2) a planar antenna 3 on the substrate 1 (Drawing 1, paragraph [0016]); and
- (3) a discharge tube 2 near to the antenna 3 (Drawing 1, paragraph [0016]).

Ichiki teaches the antenna 3 having a flat meandering shape with one turn, but does not teach the antenna 3 having a plurality of turns extending in alternating directions. However, Yin et al disclose a miniature inductive coupled plasma source (ABSTRACT). Yin teaches that the miniature ICP is formed from a spiral coil (page 1517 & 1518, Figure 2-bottom) and a planar spiral coil is desired (page 1517 & 1518, Table 1, Figure 2-bottom). As shown in Figure 2, the planar spiral coil has a plurality of concentric semicircles/circles (i.e. plural turns) and some semicircles extend upwardly while other semicircles extend downwardly (i.e. plural turns extending in alternating directions, Figure 2 –bottoms). Yin also indicates that such configuration generates uniform and stable plasma and improves efficiency (page 1517 & 1519, Figure 4). Therefore, it would be obvious for one having ordinary skill in the art to utilize planar spiral coil with plural turns extending in alternating directions as suggested by Yin in order to improve the efficiency of Ichiki.

21. Regarding claim 2, the plural turn of planar coil (i.e. antenna) of Yin is near to the edge of the substrate (Figure 3 on page 1518).

22. Regarding claim 3, Ichiki teaches a copper plating layer (paragraph [0016]).

23. Regarding claim 4, Ichiki/Yin does not specifically disclose the relationship between the thickness of the plating layer and the depth. However, Yin teaches that the optimized efficiency of the miniature ICP may be controlled by designing proper coil geometry and certain power output (SECTION B on page 1517). Therefore, one having

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ordinary skill in the art would have realized to optimize the thickness of the plating layer and the depth of Ichiki/Yin in order to achieve better efficiency.

With respect to the cited equation, It represents optimization of the miniature ICP based on process-limiting parameters, such as the properties of the mental, and the operating frequency. One having ordinary skill in the art would have realized to optimize the ICP design in order to improve efficiency of Ichiki/Yin.

24. Regarding claim 7, Yin teaches high voltage provided to the miniature ICP (Figure 3, SECTION C on page 1518).

25. Regarding claim 15, the planar spiral coil in Figure 2 of Yin has a plurality of concentric semicircles and some semicircles extend upwardly while other semicircles extend downwardly (Figure 2 –bottoms).

26. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichiki (JP 2002-257785, cited in IDS) and Yin et al as applied to claim 1 above, and further in view of Moslehi (PG-PUB US 2001/0047760).

27. Regarding claim 5, Ichiki/Yin teaches the substrate made of quartz (paragraph [0016] of Ichiki), but does not teach the substrate being made of the material as claimed. However, Moslehi discloses an apparatus for ICP (induction coupled plasma) generation (ABSTRACT). Moslehi teaches that the ICP source with coils requires the plasma source wall/substrate made of quartz tube or alumina tube (paragraph [0006]). The teaching of Moslehi shows that an alumina substrate for ICP source is an equivalent structure to that of quartz substrate. Therefore, one having ordinary skill in

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the art would have found it obvious to substitute the quartz substrate with an alumina substrate because they are art-recognized equivalent.

28. Regarding claim 6, Moslehi teaches an alumina substrate (paragraph [0006]).

Conclusion

29. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xiuyu Tai whose telephone number is 571-270-1855. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/X. T./

Examiner, Art Unit 1759

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1723